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On the Move: Technology, Mobility, and the Mediation of Social Time and Space

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The current explosion in mobile computing and telecommunications technologies holds the potential to transform "everyday" time and space, as well as changes to the rhythms of social institutions. Sociologists are only just beginning to explore what the notion of "mobility" might mean when mediated through computing and communications technologies, and so far, the sociological treatment has been largely theoretical. This article seeks instead to explore how a number of dimensions of time and space are being newly reconstructed through the use of mobile communications technologies in everyday life. The article draws on long-term ethnographic research entitled "The Socio-Technical Shaping of Mobile Multimedia Personal Communications," conducted at the University of Surrey. This research has involved ethnographic fieldwork conducted in a variety of locales and with a number of groups. This research is used here as a resource to explore how mobile communications technologies mediate time in relation to mobile spaces. First the paper offers a review and critique of some of the major sociological approaches to understanding time and space. This review entails a discussion of how social practices and institutions are maintained and/or transformed via mobile technologies. Ethnographic data is used to explore emerging mobile temporalities. Three interconnected domains in mobile time are proposed: rhythms of mobile use, rhythms of mobile use in everyday life, and rhythms of mobility and institutional change. The article argues that while these mobile temporalities are emerging, and offer new ways of acting in and perceiving time and space, the practical construction of mobile time in everyday life remains firmly connected to well-established time-based social practices, whether these be institutional (such as clock time, "work time") or subjective (such as "family time").

Keywords mobility, modernity, social change, telecommunications, time

The current explosion in mobile telecommunications and computing technologies provides the potential to transform "everyday" time and space. Indeed, this transformative theme can be found not only in social research, but also in marketing imagery (the "anywhere, anytime" connectivity promised by mobile technologies and services), and in the everyday stories of those who currently use the technologies for a variety of purposes. Current research on the construction of everyday space, place, and movement through it demonstrates that changing geographical/spatial practices affect the social regulation and subjective experience of time. It is now commonplace in social and cultural geography to argue that time and space are always interlinked—changes in space provoke changes in time, and vice versa (Adam, 1990; Giddens, 1990).

Historical and contemporary work in cultural geography, sociology, and anthropology has pointed to the mediating role of technologies in structuring the relationship between the individual and his or her social milieu in time (Massey, 1992, 1993; Traweek, 1988). However, to date, sociologists have treated the transformation of time and space via information and communication technologies as a largely theoretical question. Abstract statements are made about how, for example, time is "compressed" or space is "distanciated" via the politics, institutions, and telecommunications infrastructures of new technologies of information and communication. These theories make little or no reference to the empirically specific social practices through which time and space are framed and apprehended on an everyday basis. This is also the case when mobile technologies are addressed as a specific technology among related information and communication devices and services.

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This article seeks to redress this imbalance by exploring the case of the emerging temporalities of the mobile phone. The argument draws on a 3-year ethnographic research project, entitled "The Socio-Technical Shaping of Mobile Multimedia Personal Communications," which examines the design, production, and use of mobile personal communications technologies. It has involved observational fieldwork and interviewing among a variety of groups and locales, including the observation of public spaces such as trains, train stations, main streets, and malls, as well as interviews with consumer groups such as teenagers and workers who are "on the move" in their professional lives, and interviews with mobile technology designers, sales staff, marketing departments, and telecommunications regulators.

This article is an exploration of the relationship between time and "mobility" and investigates the proposition that mobile telecommunications entail temporal as well as spatial mobility. It proposes three aspects of temporal organization in the social practice of emerging "mobile times": the rhythms of activity with mobile devices; the rhythms of incorporating mobile devices into everyday temporal organization; and the rhythms that organize the relation between everyday life and wider sociocultural change. The article suggests that the relationship between mobile space and time in contemporary life is not constant, but rather locally mediated on a number of levels, from the personal, to the institutional and collective. While some social times are being newly reconstructed as mobile through rhythms of use in everyday life, these new mobile rhythms are equally embedded in very familiar, but locally defined, temporal practices. The effect of these changes therefore differs among social groups, and the questions of relevance to our understanding of "mobile time" should not only be descriptive (what is changing, what is staying the same), but also qualitative—what are the consequences of these changes and continuities, for whom, and who benefits?

SPACE, TIME, AND MOBILITY

The conceptualization of "mobility" is commonly one that has come to denote an individual body's movement in fundamentally geographical space, and between locations (which includes the spaces "in between" while moving). Shifting popular cultural notions of geographical space are certainly apparent in the case of mobile telecommunications. The recent television advertisements in the United Kingdom in which a mother working in a European city tells her son a bedtime story by use of her mobile phone, or a group of young men coordinates attendance at a football game via mobile phone while in the same house, emphasize the devices as tools to engage simultaneously in work and leisure relationships despite distance or location. Mobile technologies are sold on the basis that they provide "anytime, anywhere" connection, whether that connection is via voice or (increasingly) data connectivity (Green & Harvey, 1999). Advertising presents mobile technologies as devices to transcend the "limitations" of geography and distance, including those posed by geographical differences in the location of work and home activities. Certainly in research on mobile technologies, geographical dimensions have been at the forefront of enquiry (see, e.g., Laurier, 1999).

The introduction of technologies (telecommunications in particular) that no longer require connection at a fixed location prompts a reexamination of what is meant by proximity, distance, presence, and mobility. One initial way to approach this reevaluation is to consider some of the important social and cultural changes in Western societies across the 20th century, and the role of technologies in these changes as related to both space and time.

The Spaces and Experiences of Modern Social Life

One of the most significant developments of modernization across the 20th century has been the construction of the modern urban metropolis. In the modern city, the construction of urban spaces transforms previously continuous geographical locations into a series of fleeting places, images, and encounters in crowds (Simmel, 1997). The construction of modern urban space (including telecommunications infrastructures), by concentrating population and allowing for dense copresent but ever-changing interactions amongst centralized infrastructures, has contributed to a changing experience of time-bound social relationships. These have shifted from those of durable copresent interactions to fragmented and disconnected spatial and temporal connections. The spaces of the city separate "the private" from "the public," and institute locations (geographically defined spaces) and places (subjectively, socially, culturally, and geographically defined spaces) that have little connection with each other. Public social life therefore becomes an experience of discontinuity, where activities became compartmentalized in a series of fleeting encounters and impressions of little duration (Simmel, 1997; Frisby, 1985). Private social life, by contrast, becomes that of copresence, continuity, and proximity, instituting a divide between geographically defined public and private spaces.

Social and organizational activities in the newly emerging city required new forms of coordination, and technologies to manage it. Travel was one such set of technologies, as people became newly mobile and needed to coordinate times to meet or organize activities (Lash & Urry, 1994). The coordination of copresent activities via the technologies of travel required greater attention or orientation to (and discipline by) "clock time" as the prevailing organization of temporally based activities, including attention

to measurable, calculable, and linear units of standardized time. The development of new production processes in industrialization and the role of clock time in new forms of work organization all helped institute new forms of time, centered around changes in interval, sequencing, and duration. The main thrust of these arguments is the move toward measurable, calculable units of clock time, standarized and shifting toward ever shorter time periods (Lash & Urry, 1994). Lash and Urry (1994, p. 229) argue that the ascendence of clock time is attributable to such interacting changes as

> the disembedding of time from social activities as it becomes significantly stripped of meaning; the breakdown of time into a larger number of small units; the emergence of the disciplinary power of time; the increasing timetabling and hence mathematization of social life; and the emergence of a synchronized measure of life first across national territories and later across the globe with the development of Greenwich and "world time."

Simmel (1997) implies that the public life of the city in this case becomes an aggregation of privatized and individualized activities and agendas, bearing little relation to others. This particular development is detailed in du Gay et al. (1997) in their research on the Sony Walkman. In the case of the Walkman, private, subjective, and emotional geographies are mapped on to the public spaces of the city, transforming public space into a continuation of private, subjective experiences, rather than a collective of shared experiences. Cooper et al. (forthcoming, p. 4) suggest that "it is worth considering whether the increasing development and use of mobile technologies represents a kind of accentuation of the fragmented and individualized experience of modernity. Whereas it could be argued that the development of new tools and technologies are driving these changes, they reflect changing social notions of time more generally across the twentieth century."

As Lash and Urry (1994) note, it is not only the individual moving through city streets who experiences the changed times and spaces of modern urban life, but also the car, train, and bus travelers, who "transcend" what was formally understood as the "tyranny" of distance. Raymond Williams (1974, p. 26) identifies "mobile privatisation" as the contemporary experience of car travel:

> at most active social levels people are increasingly living as private small-family units, or . . . as private and deliberately self-enclosed individuals, while at the same time there is a quite unprecedented mobility of such restricted privacies . . . what is experienced inside them . . . is movement, choice of direction, the pursuit of self-determined private purposes. All the other shells are moving, in comparable ways but for their own different private ends. They are not so much other people, in any full sense, but other units which signal and are signalled to, so that private mobilities can proceed safely and relatively unhindered.

The increase in mobility, the development of temporal coordination, and the emergence of technologies designed to address the problem of "distance" in the city contributed to changing relations of physical presence and absence in newly formed urban spaces, and a changing subjective understanding of what Giddens (1990) calls "presence-availability." This includes both distance and proximity as related to physical copresence, as well as presence and availability as newly mediated via emerging technologies. The central argument is that throughout the 20th century, changes in physical proximity and distance—including the effects of technologies designed to address time and distance, as well as a shifting consciousness of temporality—have "dislocated," "disembedded," and "disembodied" individuals from local, collective and copresent understandings of, and activities in, time, by "stretching" social relations.

However, if we turn to examine specific contemporary communications and information technologies, and the social relations that attend them, the general and universalizing arguments around changes in "presence availability" begin to look more problematic.

SPATIAL MOBILITY, TIME, AND TELECOMMUNICATIONS TECHNOLOGIES

Marshall McLuhan (1964, p. 271) wrote, "The telephone is an irresistible intruder in time and space." Historical analyses have indicated that changes in temporal organization across the 20th century have involved changing relationships between natural, social, clock, and subjective time, as well as changes in space, mobility, and the boundaries of the public and private in the construction of the modern city. Other recent research has traced the specific transformations that have taken place with the introduction of different kinds of telecommunications and new information technologies. Social investigations of the "tele-presence" that the telegraph (Standage, 1998), the telephone (Fischer, 1988), and more recently the Internet (Boden & Molotch, 1994) have made possible have pointed to the central role these technologies have played in changing relationships across geographical space and time. Indeed, technologies such as the telephone are specifically spatial: Their sole function is to support social communication at a distance, and their ability to collapse distance has made possible many spatial features of contemporary urban life. The office towers of late modernity, for example, could not exist without the telecommunications technologies to coordinate their internal spaces (Pool, 1977; Townsend, 2001).

It is a well-established premise in social thought that the dominant technologies of a particular historical period define temporal organization and cultural understandings of it. Recent investigations of capital, industrial, and labor times (Thompson, 1967; Thrift, 1996; Rifkin, 1987;

Adam, 1990), or "internet time" (Lee & Liebenau, 2000), are cases in point. According to some researchers (Ling & Yttri, 1999), mobile devices again reconfigure the spaces of urban social life. If mobile devices are "space-adjusting technologies" that provide resources for understanding a sense of place and relationship in both professional and private life, as Frissen (1995) suggests, then the changing times that attend changing spaces are also at issue. In research on the social aspects of mobile technologies thus far, for example, the notion of time flexibility has been a recurring theme, as has the "compression" of activities and relationships into more periods of shorter duration of communication (Townsend, 2001). There also seems to be an unprecedented level of simultaneous copresent and tele-present interaction made possible through mobile technologies (Cooper et al., forthcoming).

These concerns about duration, interval, and sequencing, as well as issues of presence, absence, and availability, are sometimes explained via analytical projects that concentrate on the specific changing temporal organization of new information and communication technologies (see, e.g., Lee & Liebenau, 2000). These projects describe changes in the context of spatial proximity and distance, such that changing activities are said to intensify to the extent that the subjective experience of time is "fast" or "speeding" (an intensification of more and different activities of a shorter duration) (Virilio, 2000; Townsend, 2001). The decentralization of communication creates new webs of potential interaction between atomized individuals, which on the one hand increases the communication activities carried out, while at the same time fragmenting that communication into more numerous communications of shorter duration. According to Townsend (2001, p. 4), this is "dramatically speeding the metabolism of urban systems, increasing capacity and efficiency. The 'real-time city,' in which system conditions can be monitored and reacted to instantaneously, has arrived." Some theorists, such as Virilio (2000), therefore note the ways that the "speed" of electronic communications involves an immediacy of action such that movement in physical space becomes no longer even necessary. Lash and Urry (1994) also cite Nowotny (1994), who argues that the immediacy presented by new technologies of information and communication result in an experience of "instantaneous time." As Adam (1990, p. 140) notes, if all multiple activities in time are experienced as "instant" in this way, the future conflates with the present, concentrating and intensifying social action, entailing panic about and distrust of "the future" (Adam, 1990, p. 140).

For those who accept that the experience of time is "intensifying," "speeding up," or becoming "instantaneous," this type of change is attributable to a number of different factors. Harvey (1990), for example, attributes the "space–time compression" just outlined to the acceleration of the activities of capital over the 20th century, in which time and space both become abstractions and cease to have meaning or value in themselves; their meaning and value are instead determined by the circulation of capital, especially in commodification and representation. Giddens's (1990) view largely echoes Harvey's, but also considers how time and space "distanciate" as well as "compress." Although time–space compression (or "convergence" in Giddens's argument) describes shrinking distance in time (the span of time it takes to move from one location to another), "time–space distanciation" describes "the processes by which societies are 'stretched' over shorter or longer spans of time and space" (Lash & Urry, 1994). The structuring of time–space distanciation relies on such social relations as "presence-availability"—the organization of presence, absence proximity and availability, and the degree of copresent activities in relation to "tele-present" activities. It also relies on mediating technologies, such as information and communications technologies, and the control and storage capacity of them. These relations are interlinked, such that the relation of time and space may be routinized in different ways depending on forms of urban structure, the interaction of different transportation and communication technologies, the role of the state and surveillance of populations (Green, 2001), and the commodification of time in labor, industry, leisure, and consumption.

As Lash and Urry (1994) note, however, Giddens's and Harvey's theories rely on a largely generalized and universalized approach to "western societies" that tend to ignore the role of the specific and the local, and how changing times become routinised in mundane and habitual daily life. Several points in Thrift's (1996, pp. 1468–1469) critique of theories of new information and communication technologies are salient here: Thrift argues that these theories tend to argue from extremes; that the technologies are assumed to replace the ones that had gone before; that the technologies are described as seamless systems without interruptions or limits, presented as coherent and consistent, without difference or locality; that the technologies are assumed to be likely to spread everywhere, quickly; that they are "rarely seen as a linked repertoire of practices"; that they are positioned in opposition to a distanced and controlled nature; and that they are mainly comprised of representation, rather than technical repertoires in use.

Doreen Massey (1993, pp. 61–62) adds that "power-geometries" are also crucial in the construction of space–time relations, and can be drawn out by asking *whose* mobility, *whose* times and spaces are under discussion:

> For different social groups and different individuals are placed in very distinct ways in relation to the flows and interconnections. This point concerns not merely the issue of who moves and who doesn't . . . it is also about power relation *to* the flows and the movement. Different social groups have distinct relationships to this anyway—differentiated mobility:

> some are more in charge of it than others; some initiate flows and movement, others don't; some are more on the receiving end of it than others; some are effectively imprisoned by it.... This is, in other words, a highly complex social differentation. There is the dimension of the degree of movement and communication, but also dimensions of control and initiation.

Massey argues coherently for analytical sensitivity to both geographical space and social and cultural locality in considering the relations of space–time. She argues for attention to the complex relations between space, locality, time, social organization, and culture, so that the heterogeneous effects of changing social institutions alongside changing technologies can be understood and "mapped." This argument emerges from a concern to (re)introduce notions that describe social and cultural difference, such as gender, ethnicity, and sexuality, to analyses of time and space. As an illustration, one story that we were told in the course of fieldwork pertained to the case of India, and was related by an educational anthropologist. After traveling several days to reach a small village in northern India, she spent time in the village looking at educational systems. While there, she came across the one person in the village who owned a mobile phone. This individual had made a business out of calling friends and relatives of villagers elsewhere (in the absence of any fixed line services), taking on the role once held by village letter writers. The notion of "changing mobile temporalities" has very different origins, and very different implications for these villagers, than they do for the "flexible schedulers" (like myself) in the West.

In summary then, sociologists have identified a number of overlapping times that both reflect and contribute to social organization, including various "natural" times and cycles such as diurnal, lunar and seasonal times, the calendar, clock, universal/standardized, and regional times that emerged with the development of the modern city, as well as the locally organized and lived times of the public and the private (such as "on time" and "off time") (Adam, 1990; Lash & Urry, 1994). They have also traced how various technologies have historically mediated these rhythms, and how technologies can have multiple temporal effects. As Massey (1992) and Thrift (1996) suggest, setting out the connections between presence, absence, proximity, distance, and "time–space adjusting technologies" entails attention to local and situated temporal organization, as well as global and extended times. It therefore entails empirical research as well as theoretical pronouncements. While social activities mediated by mobile technologies potentially encourage fragmentation and the individualization of the experience of time, extending time–space "compression," "convergence," and "distanciation," and the speed and intensity of modern, Western life, locally shared rhythms and the social activities of lived times must also be accounted for. The emerging mobile times in their local and situated, as well as "global" incidence, can be usefully accessed via ethnographic materials.

The next section therefore outlines the relations we have encountered in our ethnography of mobile phones. They demonstrate emerging "mobile times" that must (increasingly) be considered in any theoretical discussion of temporal organization in contemporary Western societies.

MOBILE TEMPORALITY

I suggest in the discussion that follows that we might differentiate three sets of rhythms salient to "mobile time." It is the specific character of these rhythms that are important in the emerging organization of mobile times: the rhythms of mobile use; the rhythms of integrating mobile use into everyday life; and the rhythms of relation between use in everyday life and institutional social change. Rhythms of mobile use relate to the time taken interacting with a mobile device, and refers primarily to the duration and sequencing of interaction between an individual and that device (in this case, a mobile phone). Rhythms of mobile use in everyday life refer to the local temporalities associated with social and cultural relationships in which specific device use is embedded. Rhythms of institutional change refer to the historical and infrastructural elements that enable mobile use, including such dimensions as the institutionalization of travel, cycles of technological development, or the time taken to establish and maintain network technologies.

Lee and Liebenau (2000, pp. 50–51) suggest, in a study of the times of Internet use, that analytical attention should focus on the multiple "actors" of Internet systems—"the users (and uses), the publishers (and their servers), and the powers (including economic powers and regulatory or governance authorities)." If we are to account for potential social change brought about by mobile technologies, issues of access to and control over the temporal rhythms of mobility should also be addressed. Lee and Liebenau (2000) identify six dimensions of focus, including duration, temporal location, sequence, deadlines, cycles, and rhythms. I would add that these dimensions might also include the cultural and political dimensions of mobile use in everyday life. Our ethnography has been carried out over the past 2 years, and has involved fieldwork with groups such as those mobile in their working life, students, teenagers and their parents, as well as observation in main streets, in malls, on trains, and at train stations. Drawing on this research, I would like to illustrate such an analysis.

Rhythms of Device Use

The first dimension of analysis pertinent to the temporal organization of mobile devices is that of the temporal

rhythms of the use of devices and their applications. Most obvious here are the changing durations of device use for users. On the one hand, there is some evidence that mobile phones presently encourage short conversations, and introduce new opportunities for more conversation unavailable before. According to one teenager:

> It gets really confusing if you're talking to more than one person at a time. Cause if you forget what you said . . . Or you start writing to one person . . . Say like you're talking to one person and they're friends with one person that you're not . . . It gets into a big mess! And then someone phones you and when you're on the phone you can hear the beep as the message comes in. And you're like "I have to go. My bath's run." And you really just want to check your message. (A)

Ling and Yttri (1999) describe this as "micro coordination" and suggest that temporalities change as individuals engage in a kind of instant coordination when mobile, which could contribute to a subjective sense of speed, the intensification of tasks, and the fragmentation of communication. Teenagers use mobile phones in the same ways as adults for these coordinating activities:

> Just like cause I always ring my mum to tell her whether I'm walking home or whether I want her to pick me up. Just like pick up times and stuff and whether I'm staying late cause sometimes I help out and I teach. And also I use it at break times, and when I'm at work as well. (J1)

The use of short text messaging (SMS), especially among young people, might also support these arguments. Language in which words and phrases are abbreviated might contribute to interactions of much shorter duration than previously available, adding to a subjective sense of temporal fragmentation. Teenagers describe their use of language in these circumstances:

> You know, instead of "you are" you just put "u r," or "2" instead of "to." (G)
>
> With abbreviations it's more like a colloquial thing. As in who you're in with . . . It's the way you guys speak together anyway. (A)
>
> Like if you were talking to your Mum, you wouldn't write "CU." You'd have to write "See you." But if you're talking to your friends then you write "cul8r," because they understand it as well, they're like the same sort of . . . they understand the phones more than the parents do. (J)

The relatively short duration taken to read the messages is also involved. One mobile phone professional commented:

> I use it at work . . . but then when I message, it's to my friends, especially if I'm on the train or something . . . mostly its just one-liners . . . like a competition about who can come up with the best one-liner. (M)

At the same time, however, many teenagers reported that they spend many hours a day (and night), sometimes hours at a time, short text messaging among their peers. These long durations act to consolidate their peer relationships, differentiate them from family or household relations, and contribute to a growing sense of both independence (from family) and collectivity (among peers).

> I'm just text messaging all the time . . . like the longest time I spent was about three hours. (G)
>
> It's a bit like text messages, they're addictive. (A)
>
> I can't sleep so I have to send a message to people. And then I get moody if they don't reply. I've got ones that are recorded at like three o'clock in the morning. (J)
>
> Text messages are things that you store . . . they're kind of memories you want to keep. It would be really cool to have like a memory card for each person so I can put all their text messages in there so I can retrieve them one at a time when I want them. (L)

Different forms of communication or device use also take on different meanings depending on the context of the communication in shifting peer relationships.

> I'd much rather phone someone, but you don't, because . . . you say things that you really want to say to them in text messages. (J)
>
> Yeah, there are some things that you don't really want to say to someone's face or on the phone to them. You just send a text. (A)
>
> Yesterday a friend of mine was asking me if I still had feelings for his brother. And it's like the minute he asked the question I knew it was going to be one of those text messages that keeps going to go on and on and on. (A)
>
> [Dumping people by text message] That is the worst way. That is like a bitchy thing to do. (J)
>
> It's worse than being a coward. Its worst when calling someone when you know they're a thousand miles away and going "oh yeah, by the way, you're dumped." It's terrible. (A)

This is supported by impressions from some of the parents:

> I suspect, I may be totally wrong on this one, but I think what is happening is that kids will sometimes say things in a message that they won't, like the heart sign and things like that. You don't go like "I love you." She had this boyfriend in Liverpool . . . I suspect a lot of the messages were more like greeting cards, or soppy . . . I think if you want to say something like "Pick me up at the station," I'm not sure you would really message that, would you? It is something you need to get an answer to straight away.

Other features of device interaction reinforce this, such as time spent adjusting and sharing mobile phone address book entries (on a "who's got whose number" basis), or spending time showing friends messages that have been sent and received.

> People will always just look at your phone . . . (A)
>
> . . . and read your messages. (J)
>
> But everyone does it. But the thing is it's like someone's diary. (J)

> Yeah, I think its personal. I don't read anyone's messages. (A)
>
> Only unless they show you. If they say "oh, look at this," then I'll look at it. (J)
>
> It's the way you interact with each person individually, I think. So it reflects with the way you use their phones as well . . . . Even when they give you text messages to read I think that's boring when I don't know who's sent it. So, if it's a sweet message, I don't get it because I don't know the other person so it's just wasted on you. But if it's a funny one you go "ha ha! That was funny, who sent it?" (A)

As these examples show, the duration spent in interaction with the device, with other people, acts to both functionally and symbolically cement the durability of social relationships in local communities. In this case, the duration of "clock time" becomes a less salient feature of ongoing interaction with significant others through the device, than subjective time. The act of using the device, and the time spent doing so, might in this way contribute to a sense of social memory among groups. As Connerton (1989) notes, the minutiae of bodily habits with objects reinforce social and cultural memory. He argues that the use of artifacts literally "incorporates" those memories and relationships in the habits of the body. Time spent using devices makes relationships durable and ongoing, rather than "fragmented."

The durations and sequencing of device use also have durable meanings for organizations such as device manufacturers. Certainly, device manufacturers study the "usability" of their devices in terms of the actions of the body and the duration of time taken to complete specific tasks. This temporal measurement contributes to the design of devices, and these times become durable, literally "objectified" in the devices themselves (such as measurements of the time taken to write text messages on a mobile device, leading to the development of predictive text software).

The results from teens just cited indicate that in the case of design, the measure of duration of activity as a measure of significance for the "usability" of devices may not be as salient as previously thought. Located practical action also has bearing on the duration and sequencing of functions: In many settings for example, we observed pedestrians on main streets or in malls coming to a standstill in order to use some of the functions on their mobile. They were compelled to become immobile to use their mobile device.

Moreover, our interviews with sales and marketing personnel in network operator organizations indicated that network operators record times and intensities of network activities both for billing purposes, and thereafter use the information to build a picture of their consumers. If duration is significant in local ways, network activity, the mathematization of categorization of users into high-use/high-value, low-use/low-value groups as an indicator of consumer practices, might belie changing social patterns of communication and changing patterns of sociality. Perhaps what is more salient is the relationships being maintained through those time-bound activities.

Rhythms of Everyday Life

These aspects of device use are integrated into emerging patterns of organizing mobile communications and relations in everyday life. One aspect of temporal location significant for users (and for service providers) is the "anytime, anywhere" availability provided by mobile devices, which integrates microcordination and device use discussed earlier with the rhythms of work, family, and leisure times (Green & Harvey, 1999). For users, the always-availability implied by mobile time and space affects the sequencing of life tasks, deadlines organized around work and home activities, the cycles of work, leisure, and family life, and the rhythms of diurnal, lunar, seasonal, and calendar change—all of which have social implications. The case of Catherine, a sales representative whose work communications are primarily conducted via her mobile phone, is illustrative.

> My mobile is my life . . . well, my car and my mobile. I live in the car. I'll use the mobile for work calls at home in the morning, and then when I'm driving as well, to report back to the office about visits, or to make queries on orders, or whatever . . . I use it to call friends when I'm on the road, but mostly when I'm stuck in traffic jams. If someone rings I'll take the call . . . but mostly, if I'm stuck, I'll ring my Mum. My Mum and I talk quite a lot most days.

Although Catherine's life remains, at least in part, structured through formal or clock time (for example, she regulates work time into compartments of daily and weekly duration), decentralization of both her work and home life prompts flexibility and individualized scheduling. The mobile phone interrupts the time-based coordination of communication and information activities required for scheduling from fixed locations. Individuals may thus organize their activities around flexible compartments of time, rather than compartments of time associated with particular geographical spaces.

At a mundane level, there has been significant research on the "always-availability" of mobile temporality (Green, 2001; Green & Harvey, 1999; Brown et al., 2001.)—to be always and at every time "on call"—and its potential to transform the ways that individuals organize their activities in time and the ways they arrange their "schedules." A kind of spatial and temporal "boundary rearrangement" becomes possible, and has begun to appear in our research. This involves both the case of "public" activities and responsibilities (as in the case of work) that become embedded in the temporal rhythms of the home, as well as "private" relationships becoming integrated into the public sphere in mobile relations.

In the former case, research has tended to concentrate on how mobile teleworkers organize their work and home life, and Ellen Ullman's (1997, p. 136) work echoes the findings of our own research:

> It's not surprising to me . . . [m]y work hours have leaked into all parts of the day and week. Eight in the morning, ten at night, Saturday at noon, Sundays: I am never not working. Even when I'm not actually doing something that could be called work, I might get started at any minute. So everything is an interruption . . . everything must be refused because it is possible that from one moment to the next I will get back to something . . . . The building I live in . . . is full of little one- and two-person companies . . . . In the afternoons, I see us virtuals emerge blinking into the sunlight. In the dead hours after 3 p.m., we haunt cafés and local restaurants. We run into each other at the FedEx drop-box or the copy shop. They, like me, have a freshly laundered look, just come out of pajamas or sweat pants, just showered and dressed.

It is this time-based (rather than space-based) organization of activities that defines "accessibility," a redefinition of "public" and "private" time into "on time" and "off time." Laurier (1999) suggests that using the technology to its full potential can, precisely, help individuals to control time, and thus to control the organizational relationships of which they are a part. The decentralization of work activities, and the practices of "assembling the mobile office" on the part of "nomadic workers," entail the simultaneous management of private activities, as when mobile teleworkers coordinate their work life from/at home (Steward, 2000). "Public" work activities are drawn into "private" spaces, with a variety of effects on an individual's home and family life. Nevertheless, while this temporal boundary rescheduling might positively produce spatial and temporal flexibility for users, this is not necessarily the case (Steward, 2000).

Some research, including our own, has indicated that mobile teleworking can have negative effects for workers and families when they have been compelled, rather than chosen, to work in this manner. Hill, Hawkins, and Miller (1996), for example, investigated the domestic effects of mobile telework. In a quantitative and qualitative survey, the private contexts of mobile use for telework were examined, and teleworkers reported that the flexibility to be permanently available for work impacted on their personal and domestic life such that they had *less* time for their home and family. The advantages of mobility and "telepresence" were, for those surveyed, sometimes offset by the drawbacks of permanent availability for work. Debbie, a student who is also a mother, and works for a charity, says:

> I always try to turn my mobile off on the train. I mean, its like, if you don't then there's always something . . . always someone trying to get hold of you . . . . I mean apart from it being really boring having to listen to other people's conversations . . . and I *like* having that journey, it's time to myself, on the train. If you're going to places, on your way to places, then people can't get hold of you if you don't want them to.

These effects were also strongly influenced by their degree of choice in "becoming mobile." Mobility was perceived negatively when individuals had not chosen to undertake their work via mobile and telepresent means, but were required to do so by their employer. It seems that mobile teleworking and the temporal rhythms as well as geographical locations involved have different effects for users depending on their levels of access to and control over mobile work activities and their status as mobile teleworkers.

Such issues of access and control of mobile activities draw attention to the differential effects of mobile technologies for different users. If we are to consider Massey's (1993) notion of power geometries, we need to ask who has access, who has control of time, and who doesn't, in emerging mobile temporalities. This is also at issue in instances where the temporalities of private relations are potentially shifted via mobile technologies into public life.

We have encountered numerous instances in our research where the use of mobiles in public space has been employed to maintain "private," family, or community relations. Young people, especially young women, will use devices to maintain relationships with significant others both while traveling alone (to avoid encounters with strangers) and at specific times (such as late night, or "when it's dark"). Their marginalization in public space, at specific times, leads to their increased use to the device to maintain contact with significant others. The mobile therefore has different uses and effects for these groups than for others.

> It's a security thing, kind of. (S)
>
> Yeah, whenever I'm walking somewhere and I'm really scared I have like 999 [the UK emergency number] dialed already. I just have my finger on the button. (L)
>
> When I used to finish work and I'd be walking to Claire's house or something, . . . I'd always phone Paul so I could speak to him while I'm walking so I'm not quite so scared. (S)
>
> I mean a lot of parents buy their phones for their daughters anyway . . . or maybe sons, 'cause they want to know where they are, keep in contact and they can ring whenever. (P)

This theme of mobile technologies creating the subjective experience of being "in touch" or connected when alone at specific times is beginning to loom large, and also indicates that a gender analysis is crucial in the experience of everyday rhythms of mobile temporality.

At the same time, relationships between teens and parents can also become fraught with anxiety when

mobility becomes mapped on to the teenager's struggles over autonomy, and this often has specific temporal aspects (such as curfews). Teenagers who buy pagers to stay in contact with their friends (at any time) become frustrated when parents use those technologies to contact the teenager and monitor their activity in space and time:

> My mum used to be like that, and hates them, but she always wanted to know where I was, so . . . that's what I don't like. Everyone knows where you are all the time, that's why I don't like them. (D)
>
> You don't tell them where you are! (G)
>
> I'll be out, and I'll go to my friend's house . . . until really late, and mum would get worried, and I won't phone home . . . and so they're all getting all stressed, and "you're not going anywhere again," and with the phone they can just say "oh, what time are you coming home, are you all right, blah blah." (G)
>
> Sometimes they [ask where I am]. If I say "I'm going there," they'll think I'm still there, and stuff like that . . . . Or I won't say, I'll say "I'm just out with one of my friends." (H)
>
> If you say you're at a friend's house then they know you're there, they think its better . . . because they can try and call you on the house phone 'cos that's where you're supposed to be, so they'll try and call there, 'cos then they know where you are. (G)
>
> You just lie. It's just lying. (H)

For parents then, mobile technologies may assist in the temporal ordering and regulation of individual and family activities. Parents have also, however, talked about disruptions to the temporal rhythms of domestic life caused by mobile phones in our research. Some are convinced that teenagers who call their children in the early hours of the morning would not do so on a fixed-line phone for fear of disrupting the temporal rhythms of the household. There might also be differences in the social implications of "always-availability" on the part of parents. When we consider that women have demonstrably invested more time in the maintenance of familial and intimate relationships via telecommunications devices (Rakow, 1992; Rakow & Navarro, 1993), it would seem that being "always available" for home as well as work activities via mobile devices may have significantly different effects for women and men. One mother says:

> I like to feel, not that I can instantly get hold of her, but that she can get hold of me . . . . But having said that I think I get more calls like can I go and pick her up, "I've just missed the last bus." In that sense I think it creates more work for parents.

In summary then, the personalization of mobile devices—their attachment to an individual person/body and their temporal rhythms, rather than to specific locations, the personalized nature of the technologies and the attendant atomization of communications—can then potentially fragment both "public" and "private" communication activities, collapsing each into the other. Being available, being connected may be seen as a strategic form of social behavior that enables participation in a preferred and familiar social space no matter what the immediate surroundings may be. At the same time, when all social activities become coordinated through the same device, what time is on and off, and when, for what, becomes a primary site of negotiating social relationships and conflicting roles in everyday life. The issues of who has access to and control of mobile devices (or not), and when, seem the central issues in the local organization of mobile temporality.

The relations of everyday life just described should be seen in the context of the temporal rhythms that regulate and inform the practices of network operators, service providers, and governmental and regulatory authorities. On the one hand, there are the specific temporal cycles of the present cellular (and potential satellite) infrastructures. Cellular networks go through regular cycles of call loads, regular times when the network is "busy." Furthermore, the temporal location of the cellular infrastructure in any particular place will also affect who can call whom, where, and when. Long-term cycles of infrastructural development, including decisions about where to locate physical cell sites (masts/antennae), how many, and when, go through regular cycles of strategic planning and development, which depend on the different contingencies of the network operators' schedules. The rhythms of the technical infrastructure do not depend only on technology development, however. They are also determined by the monthly, quarterly, and yearly rhythms of the financial calendar, and how particular organizations organize strategic analysis, market development, and the (sometimes overlapping, sometimes contradictory) programs of business planning and management. While linked to longer term technical and social change (discussed later), these temporal aspects of mobile organization affect how mobility takes place in everyday life for users (who gets to connect and when), and also determine the daily, monthly, and yearly scheduling and deadlines within operator organizations.

Rhythms of Institutional Change

The temporal locations, the deadlines, cycles, and sequences of the technical infrastructure, and the organizational temporalities related to its planning and development draw attention to the time scales involved in the relationship between technical development in industry organizations and government and policymaking processes.

Although ostensibly in competition, industry actors often coordinate their interaction with public authorities in

time, affecting both the nature of technical infrastructures and the networks and services available to consumers. The process of formulating network standards and the governmental regulation of business activity and auctions of network bands are examples of standards setting, regulation, and policymaking processes that are situated in time. The yearly schedules of when governments meet and policy is set, the regular cycles of civil service regulation, and the product and service development attendant upon them in corporate organizations all have impact on the technical and economic times of mobile development.

Certainly for industry players, time is money, in this sense. Or perhaps, as Barbara Adam suggests, money is time (1990, p. 114). One thing that is certain in the mobile industry, as elsewhere, is that time itself has become a commodity—hence the value of mobile devices and services in markets. Once time becomes a commodified resource (we can "save" and "invest" time, for example), it becomes not only disembedded from related value, but disembodied from any specific activities in daily life. It is only in this culturally specific connection between time and money, for example, that cultural perceptions of "wasting" time, of "dead time," become influential. Perry et al. (2001) have suggested, for example, that mobile devices act as "Lazarus" devices—devices that "resurrect" mobile time that would have previously been considered "dead," "economically unproductive" (such as time taken to travel from one place to another). This implies that an emerging mobile temporality is "Lazarus time," productive time that has been resurrected from unproductive "dead time" via the use of mobile technologies. The implication that time is money is relevant not only for those in the mobile business, therefore, but also for the mobile temporalities of users. According to Townsend (2001),

> time becomes a commodity to buy, sell, and trade over the phone. The old schedule of minutes, hours, days, and weeks becomes shattered into a constant stream of negotiations, reconfigurations, and rescheduling. One can be interrupted or interrupt friends and colleagues at any time. Individuals live in this phonespace—they can never let it go, because it is their primary link to the temporally, spatially fragmented network of friends and colleagues they have constructed for themselves. It has become their new umbilical cord. (p. 70)

"Institutional change" in the form of mobile temporality, therefore, is not only related to the governance of social institutions or the dominance of corporate business, and the "convergence" or "distanciation" to the infrastructural elements of whole societies (although the importance of these elements has, I hope, become apparent). Nor does it only lie in changing technical infrastructures and the social implications they might have for changing temporality when mobile. Nor is social change simply related to the changing daily activities of individuals as they reschedule and become flexible. To consider the implications of mobile temporality for social practices, understandings, and organization of time is also crucially to consider questions of value. Who gains what through mobile temporalities? Where, and under what local and collective conditions?

CONCLUSIONS

Many sociological arguments have been made for new temporal formations through the use of new and mobile information and communication technologies—the "timeless time" of Castells (1996, p. 433), Nowotny's (1994) "instantaneous time," Virilio's "speed" (2000), and Giddens's "time–space distanciation" and "convergence" (1990). The logic of these arguments would suggest that a reconfiguration of space and time is taking place, a rearrangement that entails the individualization and fragmentation of availability, duration, cycles, and rhythms, such that the forms and purposes of the communication and the social relationships mediated and maintained through them are reconfigured.

Certainly, arguments about mobile work, flexible scheduling, changes in the duration and cycles of activities, proximity, distance, and presence might suggest that widespread social and cultural change in the practice and understanding of temporality is occurring. While the "speed" of modern urban life and potential fragmentation in social relationships via temporal changes can certainly be noted, mobile technologies also introduce opportunities for new continuities across space and time, previously disjoined through centralization. The ethnographic data presented here have been one means to address these new temporal continuities.

Furthermore, I have argued here that if attention is paid to local and situated times, to the rhythms of daily life as well as the cycles of social organization between groups of social actors detailed in analyses such as those of Giddens and Harvey, many temporalities (the social practices and understandings that form them, the activities and relationships they mediate and maintain) can be demonstrated to be relatively enduring. At least some of the relationships that comprise mobile temporalities—including those of organization and regulation—are not dissimilar (or have not changed) from well-established temporal patterns in the production and reproduction of technical and social infrastructure. What is at issue is how different temporal rhythms intersect in new ways as they are configured in different locations, and in everyday, situated action.

If we can think of social "space–time" as the network of relationships within which individuals and groups operate in everyday life, social time is comprised of the social (rather than geographical) proximity of those relationships,

as they are shaped by resources, location, value, and knowledge. The simultaneity of copresence and telepresence becomes the mechanism for connection with others. The device and its functionalities can stand in for, but can also create, a community or network. On the one hand, social space and time are "extended," and on the other, they remain locally continuous. Communities are being formed in highly contradictory ways, which reflect new disjunctures, as well as new continuities, in the relationship between space, time, and location.

What seems most at issue is not only the fact or extent of temporal change in the face of mobile technologies, but also the situated, differential effects of those changes for different individuals and social groups. These are not only descriptive questions (what has changed and how?) but also qualitative questions (with what consequences, for whom?). When the value of (mobile) time is taken into account, these questions become more pressing. The connection between mobile space and time, as articulated in multiple, heterogeneous places and rhythms, is not constant and does not have equal effects for all. Access to and control of time and mobility are always shaped by the context of situated social practice, as collectively created and maintained by a number of different individuals and social groups. In asking who benefits from these heterogeneous causes and effects, we are asking questions about the power geometries of mobile time.

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